

WHAT IS CLAIMED IS:

- 1 1. An apparatus for carrying a load during a medical procedure, the
2 apparatus comprising:
3 a base;
4 an articulating arm having a distal end and a proximal end secured in a
5 movable fashion to said base;
6 at least one positional encoder coupled to said arm;
7 a receptacle at the distal end for carrying an effector;
8 means for load balancing said arm when said effector is engaged; and
9 a controller coupled to the positional encoder(s) to track the position of the
10 arm in real time.
- 1 2. The apparatus as described in claim 1, wherein said controller is a
2 closed loop control device.
- 1 3. The apparatus as described in claim 1, wherein said controller is a
2 position tracking device.
- 1 4. The apparatus as described in claim 2, wherein said closed loop control
2 device is also able to track orientation of the arm in real time.
- 1 5. The apparatus as described in claim 1, wherein the means for load
2 balancing is a robotic driver in electronic communication with said positional encoder(s)
3 wherein the robotic driver can position the articulating arm according to a set of input
4 commands.
- 1 6. The apparatus as described in claim 4, wherein said input commands
2 further comprises a series of movement commands for said robotic driver.
- 1 7. The apparatus as described in claim 1, wherein the means for load
2 balancing is one or more passive force generating device(s).
- 1 8. The apparatus as described in claim 1, wherein the means for load
2 balancing is one or more active force generating device(s).

1 9. The apparatus as described in claim 1, wherein the means for load
2 balancing is a combination of one or more passive force generating device(s) and one or more
3 active force generating device(s).

1 10. The apparatus as described in claim 1, wherein the means for load
2 balancing is one or more cooperative motors.

1 11. The apparatus as described in claim 1, wherein the means for load
2 balancing is a plurality of springs and counter balancing weights.

1 12. The apparatus as described in claim 1, wherein the medical procedure
2 is a procedure for the reduction in adipose tissue.

1 13. The apparatus as described in claim 1, wherein the therapy head
2 includes a high intensity focused ultrasound transducer.

1 14. The apparatus as described in claim 1, wherein said encoders are in
2 electronic communication with a computer, and said computer controls said means for load
3 balancing.

1 15. The apparatus as described in claim 1 further comprising a feather
2 touch.

1 16. The apparatus as described in claim 1, wherein said base is anchored to
2 a wall, ceiling or other fixture.

1 17. The apparatus as described in claim 1, wherein said base is a cart.

1 18. The apparatus as described in claim 1, wherein said base is anchored to
2 an examination table.

1 19. The apparatus as described in claim 1, wherein encoder(s) are
2 rotational encoders incorporated into one or more joints of said articulating arm.

1 20. The apparatus as described in claim 1, wherein said encoder(s) are
2 linear encoders.

1 21. The apparatus as described in claim 1, wherein said encoder(s) are one
2 or more position sensors.

1 22. The apparatus as described in claim 1, further comprising a motion
2 sensor.

1 23. An apparatus for precise positioning of a medical device comprising:
2 a base;
3 a robotic articulating arm having a base end attached to said base and an
4 unsecured end attached to an effector capable of holding one or more medical devices;
5 at least one position sensor located substantially near said unsecured end and
6 capable of determining the precise position of said effector relative to a patient and said base;
7 and
8 a controller in electronic communication with said motion sensor;
9 wherein the controller utilizes data from the sensor to control the robotic
10 articulating arm to maintain the location of the one or more medical device relative to a
11 patient in real time.

1 24. The apparatus as described in claim 23, wherein the base is
2 anchored to a wall surface.

1 25. The apparatus as described in claim 23, wherein said robotic
2 articulating arm has a plurality of arm segments separated by a joint between each said arm
3 segment.

1 26. The apparatus as described in claim 23, wherein the motion sensor
2 tracks the position of each joint of said articulating arm in addition to the procedural end.

1 27. The apparatus as described in claim 23, wherein said one or more
2 medical devices may be positionally controlled through said controller.

1 28. The apparatus as described in claim 23, wherein the controller is a
2 computer utilizing a robotic software controller (PLC).

1 29. The apparatus as described in claim 23, wherein said one or more
2 medical devices consists of at least one ultrasound transducer.

1 30. The apparatus as described in claim 29, wherein said ultrasound
2 transducer is a therapeutic ultrasound transducer.

1 31. The apparatus as described in claim 23, further comprising a joint
2 between said base and said base end, so that said base end may be positioned relative to said
3 base.

1 32. The apparatus as described in claim 23, wherein said articulating arm
2 is a telescoping arm.

1 33. The apparatus as described in claim 23, wherein said robotic
2 articulating arm is moveable relative to said base.

1 34. The apparatus as described in claim 23, further comprising an
2 examination table.

1 35. The apparatus as described in claim 23, wherein the robotic arm may
2 be manually moved with in a programmed limited space, and the articulating elements
3 prevent any manual movement outside the pre-programmed field of movement.

1 36. The apparatus as described in claim 23, wherein the base is a fixture.

1 37. The apparatus as described in claim 36, wherein the fixture is a wall,
2 floor or ceiling of a room.

1 38. A method of controlling an articulating arm through at least one force
2 generating device comprising the steps of:

- 3 (a) determining a desired position for said articulating arm;
4 (b) converting said desired position to a plurality of component coordinates;
5 (c) calculating a first time position coordinate for each of said plurality of
6 components;
7 (d) transmitting a force changing command to said force generating device;
8 (e) calculating a subsequent time position coordinate for each said plurality of
9 components;
10 (f) comparing said subsequent time position coordinate to said desired
11 position; and

12 (g) adjusting said force changing commands until said articulating arm
13 achieves said desired position.

1 39. A method as in claim 38, wherein adjusting said force changing
2 commands occurs continuously.